Seddon Island Scherzer Rolling Lift Bridge
Spanning Garrison Channel, from downtown Tampa
to Seddon Island
Tampa
Hillsborough County
Florida

HAER No. FL-3

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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service
Department of the Interior
Southeast Region
Atlanta, Georgia 30303

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Location:	Spanning Garrison Channel, from downtown Tampa to Seddon Island in Hillsborough Bay Tampa, Florida
Date of Construction:	1908-09. Minor rehabilitations in 1945, 1961-1962
Present Owner:	American Centennial Insurance Company 400 Beneficial Center Peapack, New Jersey 07977
Present Use:	Limited access vehicular bridge
Significance:	The Seddon Island Scherzer Rolling Lift Bridge is the oldest, longest-span Scherzer rolling lift bridge in Florida. It is a well-preserved example of a popular type of patented movable bridge, fabricated and erected by the nationally significant Phoenix Bridge Company.
Historian:	Paula Spero Bearfoot, May 1983 Gratia B. Flores and Mary E. McCahon, August 1981

Seddon Island is located at the head of Hillsborough Bay near the mouth of the Hillsborough River and adjacent to downtown Tampa, Florida. The triangular-shaped island is bounded by three channels, Garrison Channel to the north, Seddon Channel to the west, and Sparkman Channel to the east. Seddon Island is connected to Tampa's downtown waterfront by a Scherzer rolling lift bridge which spans the Garrison Channel.

The Seddon Island Scherzer Rolling Lift Bridge permitted access to the island in its closed position, and it permitted passage for marine vessels through Garrison Channel in its open positin. The bridge, a patented Scherzer rolling lift bridge of Warren-with-verticals through truss type, is a remarkably well-maintained and well-documented movable metal truss bridge. It was designed by the Scherzer Rolling Lift Bridge Company of Chicago and fabricated and erected by the Phoenix Bridge Company of Phoenixville, Pennsylvania, in 1908 for the Seaboard Air Line Railway of Portsmouth, Virginia.

Extensive contemporary records make the Seddon Island Bridge an interesting case study of an early twentieth century movable bridge building project. Extant documents include correspondence, contracts and shop drawings. The original Phoenix Bridge Company drawings illustrate the design, fabrication details, and erection of the Scherzer rolling lift span. Coupled wth the bridge's well-documented history is the importance of the area it serviced. The story of Seddon Island, itself, reflects the interweaving of Tampa's downtown port development with the phosphate industry and the railroads. From 1909 to 1970, Seddon Island served as the Seaboard Airline Railway's deepwater loading facility for Florida-mined phosphate.

Interest in developing Tampa's harbor and channel facilities was stimulated in the 1880s primarily by the growth of phosphate mining in central Florida. Phosphate was first discovered in Florida in 1881 along the Peace River. By 1900, numerous mines had opened and the industry grew rapidly, from 3,000 tons in 1888 to 1,357,365 tons in 1907. Tampa was the closest port to the phosphate mine region and, thus, developed in response to increasing world demand for the mineral.

Port development in Tampa was hampered severely by shallow water in the upper reaches of Hillsborough Bay. Shipments to and from the city had to be loaded on or off shallow draft vessels and transferred to or from deepwater ships anchored out in the bay. In 1871, the Army Corps of Engineers sent Gustave Jaenicke to survey Tampa Bay for the development of harbor facilities. Despite Jaenicke's positive recommendaion to spend at least a quarter of a million dollars to dredge a channel to Tampa, it was not supported by his supervisor, Colonel J. H. Simpson. Simpson believed that there was not enough business in Tampa to warrant the expense and offered the counter-recommendation of spending $180,000 for a nine-mile-long railroad line to Passage Point (Port Tampa) on Old Tampa Bay.[1]

Local pressure prompted Congressional action on the harbor project in 1879. Corps Assistant Engineer J. L. Meigs, after a two-month examination of the bay in the spring of 1879, recommended that the natural channel to Tampa be deepened to nine feet.[2] A 150-foot wide channel, nine feet deep, was approved by the 1880 River and Harbor Act, but money to fund the project was slow to materialize.[3]

In 1888, Henry B. Plant began to develop Passage Point in Port Tampa as the deepwater port for his South Florida Railroad, thus shifting the emphasis of harbor work from Tampa and Hillsborough Bay to Old Tampa Bay. He built a bridge across the Hillsborough River and laid the necessary track to service Port Tampa, which eclipsed the downtown Tampa port during the late 1880s and 1890s. The River and Harbor Act of 1888 legislated a 20-foot channel for Port Tampa. Hillsborough Bay, at the same time, had only a seven-foot deep channel that deepened to nine feet in the Hillsborough River Channel.[4]

The Atlantic Coast Line Railroad purchased Henry Plant's South Florida Railrod interests after his death in 1899.[5] It had a virtual monopoly on rail and sea transfer shipping in Tampa by controlling the Port Tampa facilities and the line kept freight charges artificially inflated. The struggle between Tampa's two ports came to a head in 1905 with the passage of the River and Harbor Act of that year, that called for the widening of the Hillsborough Channel to twenty feet. The work was almost complete in 1907,[6] and Tampa's downtown port development could procede, with the groundwork laid by Atlantic's competitor, the Seaboard Air Line Railway.

The Seaboard Air Line Railway gained access to Hillsborough County routes when it absorbed the Florida Central and Peninsular Railroad on August 15, 1903.[7] Seaboard, chartered in Virginia in 1900, grew into a major southern carrier by acquiring existing local lines from Virginia to Florida. It competed successfully with the Atlantic Coast Line Railrod, which had acquired ownership of Henry Plant's deepwater facility at Port Tampa in 1899, and ultimately merged with Atlantic to form The Seaboard Coastline Railroad.

The Seaboard Air Line Railway initiated its plans for Tampa's downtown waterfront port to compete with Atlantic Coastline's Port Tampa phosphate facility shortly after moving to the Tampa area. First, Seaboard purchased much of the waterfront property. Then, in 1905, Seaboard's attorney, Peter O'Knight, secured the marshy falt in Hillsborough Bay, known as Grassy Island, for development as Seaboard's deepwater shipping terminal in Tampa. On November 28, 1905, J. M. Barr, President of the Seaboard Air Line Railway, filed a petition with the City Council stating that the railroad:

> determined to make its southern deep-water terminus in the city of Tampa, and in order to provide adequate facilities on deep water, it has purchased and is now owner of Little Grassy Island lying on the east side of the Government Channel, and asks that

> a resolution be passed authorizing the City of Tampa to convey by quit-claim deed all rights the City may have in the said Island to the Seaboard Air Line Railway.[8]

Barris' petition was unanimously passed by council for the area described as:

> located 2100' southeast of the intersection of the coastline of Whiting Street with the harbor line and 50' east of the east line of the United States government channel, thence in an east direction and parallel with the main shoreline 2700', then southwesterly direction 5900' to a point 50' east of the east line of said channel, thence northwesterly and parallel 5900' to point of beginning.[9]

The conveyance was contingent upon Seaboard's completion of the shipping, warehouse and terminal facilities within ten years.

On October 26, 1906, the United States Secretary of War approved the building of a bridge across Hillsborough Bay in Tampa, Florida.

With ownership of the island and access to it, Seaboard Air Line Railway was free to develop its deepwater terminus. It began by negotiating contracts to build the bridge. On May 29, 1907, Phoenix Bridge Company replied to an inquiry from Seaboard Airline Railway with a proposal for construction of a Scherzer rolling lift bridge in Tampa, Florida.[10] After receiving approved plans from the Scherzer Rolling Lift Bridge Company and the railway, Phoenix promised to complete fabrication of the bridge parts in three and one-half months and erection of the superstructure in four to five working days from delivery of materials at the site. Seaboard accepted the proposal and executed a contract from Phoenix on June 12, 1907. "According to this agreement Phoenix Bridge Company would furnish and erect the complete bridge superstructure including all steel work, counterweights, operating machinery, operator's house, gas pipe railing, metal stairs, lights, signals and all electrical equipment (which was subcontracted to George P. Nichols & Brother, Chicago). Seaboard would furnish all substructure work, the platform for the operator's house, the walkway from the operator's house, all ties, rails and guardrails. Seaboard Air Line Railway Company agreed to pay Phoenix $0.0589 per pound of metal and to furnish transportation over its own lines for the men and tools necessary for construction of the bridge, while Phoenix Bridge Company promised to route shipments of materials via Seaboard lines when possible and to pay full tariff rates for materials shipped.[11]

A lag in correspondence until June 1908 and an inter-office memorandum of December 1908 indicate a delay in construction of the Tampa bridge due to financial difficulties within the railroad company. In July 1908, a new agreement was signed between Phoenix Bridge Company and receivers for Seaboard Air Line Railway.[12] The essence of the original contract was maintained with modifications only in the payment schedule and construction deadline, which was changed to January 1, 1909. Still, a Phoenix Bridge Company December 1908 inter-office letter charged another construction delay from June to December 1908 to Seaboard Air Line Railway and an anticipated four to six-month continued delay.[13]

On August 6, 1909, the rolling lift span was balanced by adding pig iron to the counterweight, and Seaboard notified Phoenix that the bridge adjustment was satisfactory.[14] Construction continued on the operator's house, but by Novwember 1909 the only thing remaining was agreement on the billing charges. The final bill of sale from Phoenix Bridge Company to Seaboard Air Line Railway, dated January 13, 1910, showed a superstructure metal charge for 931,376 pounds at 5.89 cents per pound and a total construction cost of $55,935.22 for the Seddon Island Scherzer rolling lift span.[15]

The design of the Seddon Island Bridge is a typical long-span, single-leaf Scherzer rolling lift bascule. It consists of one 187'-5" channel span and one 42'-3" fixed span. There are eight truss panels of 23'-1" each in the channel span. The truss configuration of the channel span is triangular with verticals and upper chords which incline toward the counterweight, like the 1901 Scherzer Rolling Lift Bridge Company patent #721,918 and the 1901 patent #1,021,488.

Between 1893 and 1921, the Scherzer Rolling Lift Company was granted twelve patents for variations in their rolling lift bascule bridge design. This type of movable bridge was developed in 1893 by William Scherzer for the Metropolitan West Side Elevated Railroad Company of Chicago.[16] Scherzer designed a four-track bridge across the Chicago River near Van Buren Street, which engineer and bridge historian J. A. L. Waddell claimed ushered in the "modern era of bascule building."[17]

Waddell's 1916 use of the phrase "modern era" referred to the historical tradition of bascule building. The bascule bridge was the earliest type of movable bridge built. In its most primative form, it was a shallow deck which could be raised to a vertical or inclined position by means of an outhaul cable attached to the free end. The bascule bridge design evolved over the centuries, and during the late nineteenth and early twentieth centuries it was developed in numerous patented types. In general, these patented bascule designs were either of a pivoting, or trunnion, variety or a rolling type. In the rolling-lift category were the Scherzer and Rail patented types. In 1916, J. A. L. Waddell called the Scherzer bascule "the most popular of all types to the present."[18]

Scherzer's first patent was for a deck truss bascule bridge. One deck version of Scherzer's bridge provided for a main pier with a depressed pit into which the counterweight receded as the bascule opened. This design, the use of a single large pier at the rolling end, called forth the bridge's greatest criticism: "In the rolling lift the center of rotation continually changes and the center of gravity of the rotating part moves in a horizontal line, thereby shifting the point of application of the load on the pier foundation, which is a faulty feature, unless the pier be founded on rock."[19] The shifting load, applied on one main pier, decreases the pressure at one face of the pier and increases it at the other, resulting in a rocking action at the main pier.

The Seddon Island Scherzer Rollng Lift Bridge is designed after Scherzer's later patents for a through truss version of the rolling lift bascule. The bascule span rests on three piers. The shoreward fixed span is supported on Piers 1 and 2, and the free end rests on Pier 3 in the bridge's closed position. The rolling action of this through truss bascule, as it opens and closes, is a response to the horizontally moving center of gravity, exactly like the deck truss design. The piers in this case, however, are not connected at the base and the shifting point of load application only increases the direct pressure on one pier and decreases it on the other. The counterweight is designed with wings which flank the deck in the bascule's closed position.

Though the rocking action was stopped by the additional pier in the through truss bascule design, this type of bascule bridge was still not recommended for heavy bridges and compressible foundations.[20] Where appropriate, however, rolling lifts were recommended strongly for their advantages. The superstructure is of simple construction, except for the rollng segmental girders. There are no mechanical joints or trunnions, the rolling friction is small, the operating machinery is simple, and less power is required to operating rolling lifts than trunnion bascules.[21]

For railroad bridge use, the bascule bridge superceded the use of swing span movable bridges in the early part of the twentieth century. Thus, in 1908, the Seaboard Air Line Railway decided upon a Scherzer Rolling Lift Bridge for access to its deepwater loading facility. The pile-bent, wooden beam approaches to the bridge were installed by the V. M. Johns Company of Portsmouth, Virginia.[22] The Scherzer rolling lift portion of the bridge was erected on the site, and is documented in one available construction photograph.

The configuration of Seddon Island's Scherzer rolling lift bascule is a straightforward design, with respect to the patents previously noted. The 187'-5" Warren truss channel span is connected to two riveted deep circular segmental (i.e., segment of a circle) girders which roll back on the toothed horizontal track girders of the 42'-3" fixed span. This rolling action of the circular segmental girders lifts the forward channel section.

Motion for the lifting action of the bascule leaf is initiated by two motors located on a machinery platform, above the fixed span and in front of the counterweights. The motors drive through reduction gears to the main pinions. The main pinions, at the center of the quadrant formed by the segmental girders, engage horizontal racks and move shoreward along the toothed racks. These racks are connected to the fixed san by rigid frames located beyong the outer clearance of the trusses.

The Scherzer lift span is balanced by a reinforced concrete counterweight which is encased in a steel box. The bascule's counterweight is situated at the upper end of the circular segmental girders and is connected to the channel truss span by upper chords and struts.

Several methods for field adjustment of the bridge's balance were allowed with this type of counterweight. The amount of concrete placed in the steel form could be varied and pig iron could be added. To adjust the span in its closed, or horizontal, position, latitude was given during the erection process to add or hold back whatever concrete was necessary to accurately balance the bridge. The estimated counterweight concrete necessary for balancing this bridge was 7,560 cubic feet, at a total weight of 1,066,000 pounds. To adjust the span in its open or vertical position, two pockets were left in the counterweight for loose pig iron. This loose pig iron could be added, substracted and shifted from one pocket to the other to adjust the vertical balance.

Erection of the bridge's superstructure, both moving leaf and counterweight, was much like putting together a puzzle. First, the track girder spans were erected. Next, the segmental girders were set and lined up on the track girders. Then, the bottom steel sections of the counterweight box were put in place and the segmental girders were rolled into the position they held when the bridge was closed. The channel span truss was next erected. After this, the rest of the counterweight steel box was put in place, with sections removed for the addition of the reinforcing bars (7/8-inch square corrugated bars) and the counterweight concrete.

Field erection instructions were found on both the shop drawings and the truss members themselves. For example, members were marked explicitly with directions like "top end" or "toward pier #2." The drawings indicated that rivet holes were to be drilled in the shop to an iron or steel template, while all connecting parts were temporarily assembled. Most complicated sections, which could not be shipped in assembled states, were to be matchmarked before dismantling.

The bridge members were to be shop painted one heavy coat of pure raw linseed oil and pure red lead (not commercial), with parts which were inaccessible after erection to have two coats of the same. After erection, the superstructure was to be painted with two coats of paint, one coat of dark red paint and then one coat of black Dixon's Silica Graphite paint. For members at the rear end of the truss, however, surfaces which came into contact with concrete were not to be painted or oiled.

Shop drawings also illustrate details of the operating machinery for the bridge and specify materials to be used. The electrical equipment necessary for operating the lift span was subcontracted by Phoenix Bridge Company to George P. Nichols & Brother of Chicago. Gears, racks, pinions, boxes, bearings, shafting and castings were all manufactured by the Phoenix Bridge Company of designated metals which were tested in the shop for uniformly and ultimate strength. Besides steel, phosphor bronze and Babbitt metal were specified. Phosphor bronze was to consist of 88 percent copper and 12 percent phosphorized tin, which was to contain five percent phosphorus. Bronze linings were used in steel bearings; the phosphorus was added to make a uniform casting. Babbitt metal was also used as bearing lining metal and was specified by Phoenix engineers as 50 parts tin, 1 part copper and 5 parts antimony. All machined surfaces were protected in the shop with coatings of while lead and tallow.

When completely assembled and ready to be used, the bridge was operated by two electric motors which were activated from the operator's house. Navigation lights, located at the channel, gave the stop and go signals to approaching marine vessels, and were synchronized with the action of the bridge. The bridge lock was released, and it was opened to a "partly open" position. Then, it was slowly brought to the "fully opened" position. The vessel passed and the bridge was lowered. First, it moved to the "partly closed" position and then to the "closed position." Guides on the pier pedestals kept the free end from closing off center. The bridge's closing action was cushioned by pneumatic buffers, consisting of piston cylinders and rods mounted on the end floor beam and resting on the pier pedestals. In its closed position, the bridge was locked by a lever in the operator's house. The lever was connected to a gas pipe line which moved a latch through the front floor beam to a catch bar on the channel pier.

While the Phoenix Bridge Company was supervising the construction of the Scherzer rolling lift bridge, contracts for the construction of the other terminal facilities on Grassy Island were let by A. E. Seddon, Seaboard's Chief Engineer. These 1908 contracts includes wharves, storehouses, a phosphate elevator and a spur track from the Coronet Phosphate Company. In addition to this work, the Atlantic, Gulf and Pacific Dredging Company was to dredge a 24-foot deep channel adjacent to the Seaboard docks on the west side of the island and pump 350,000 cubic yards of fill to enlarge the island.[23]

Most of the contracted work on Grassy Island was completed by July 1909. The first cargo ship, the Grans Steamship Line's "Hillsbrook" arrived on July 8, 1909, to inauguarate the new phosphate-loading facility. Although records show that the bridge was not yet fully adjusted in balance until August 1909, it was evidently used in July to bring the first phosphate shipment. In the locked position, fully and completely assembled, the bascule would have carried trains safely, with only minimal wear at the free end of the span due to the unbalanced condition, particularly if used only for this premier shipment.

Chief Engineer Seddon was confident that the company's plans for handling phosphate through the Grassy Island facility would insure "that Tampa will, in a very short time, be as great a phosphate port at Port Tampa, and be capable of moving ...500,000 to 750,000 tons of phosphate...every year."[24]

During the opening ceremonies on July 9, "city officials and representatives of business and professional men of Tampa...welcomed the good steamer" and inspected the new port facility.[25] Frank C. Bowyer, President of the Tampa Board of Trade, declared a motion, in order to change the name of Grassy Island to that of Seddon Island as a memorial to the untiring energy and zeal of Chief Engineer A. E. Seddon, who had supervised the construction of the facility for the Seaboard Air Line Railway. The motion to rename the island carried by a unanimous voice vote of those in attendance.

1 George E. Buker, Sun, Sand and Water. A History of the Jacksonville District, U. S. Army Corps of Engineers, 1821-1975, (n.p. 1981).

2 Ibid., p. 134.

3 Ibid.

4 Ibid., p. 135.

5 Karl H. Grismer, Tampa: A History of the City of Tampa and the Tampa Bay Region of Florida, edited by D. B. McKay. (St. Petersburg: St. Petersburg Printing Company, 1950), p. 217.

6 Buker, p. 136.

7 Grismer, p. 224.

8 Minutes of Council, Book 7:98.

9 Ibid.

10 Eleutherian Mills Historical Library Phoenix Bridge Collection, Contract between Seaboard Air Line Railway and Phoenix Bridge Company, May 29, 1907.

11 Ibid., Contract between Seaboard Air Line Railway and Phoenix Bridge Company, June 12, 1907.

12 Ibid., Letter to Seaboard Air Line Railway Company from Phoenix Bridge Company, July 29, 1908.

13 Ibid., Phoenix Bridge Company Memorandum, December 28, 1908.

14 Ibid., Letter from Seaboard Air Line Railway Company to Phoenix Bridge Company, August 6, 1908.

15 Ibid., Bill of Sale from Phoenix Bridge Company to Seaboard Air Line Railway Company, January 13, 1910.

16 Otis E. Hovey, Movable Bridges, (New York: John Wiley & Sons, Inc., 1926), p. 101.

17 J. A. L. Waddell, Bridge Engineering, (New York: John Wiley & Sons, Inc., 1916), p. 701.

18 Ibid., p. 714.

19 Ibid., p. 701.

20 Hovey, p. 106.

21 Ibid., p. 340.

22 Tampa Morning Tribune, June 11, 1908, p. 1.

23 Ibid.

24 Ibid.

25 Tampa Morning Tribune, July 9, 1909, p. 1.

26 Ibid., p. 2.